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A COURSE IN BACTERIOLOGY FOR NURSES

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THERE can be no doubt of the fact that a working knowledge of the principles of bacteriology is of primary importance in the education of a nurse. So many facts have been established in this science, and its important relation to surgery, medicine and obstetrics so definitely proven that a sound practical knowledge concerning the relation of bacteria to disease is not only desirable but imperative. The names of not a few of the world's most illustrious men are intimately connected with the development of bacteriology; many acts of personal heroism and self-sacrifice are closely associated with epoch-making discoveries, the fruit of long-continued and patient work, with results which have well-nigh revolutionized the practice of medicine and surgery. The world over, an army of workers is busy with further investigation and the coming years will be enriched with additional discoveries tending to the conservation of life by the cure and prevention of disease.

The nursing profession by its intimate relation with that of medicine is likewise affected by these advances. A practical knowledge of the art of nursing must be built upon a firm foundation, a knowledge of certain fundamental branches, of which bacteriology is not the least important from either a practical or theoretical point of view. I do not wish to discuss the faults or the merits of our present system of training, but I do believe that insufficient time is allotted to systematic instruction in such fundamental branches. In not a few of our hospitals the pupils are required to work very hard indeed with routine duties, followed by attendance upon a course of lectures, and the quiz, and these in due time by the process of cramming with a mass of undigested knowledge for the inevitable examination. Nursing is practical, requires accurate working knowledge, and hence instruction should be systematic and practical, aiming to demonstrate and explain a few facts thoroughly rather than attempt to cover the whole in a hurried fruitless manner. Any system is faulty which turns out mere automatons, even though well trained. The aim should be towards development of the reasoning capacity and judgment with such practical knowledge as will develop and render most effective that innate sense of nursing to which most women are heir.

It makes no difference in what field a nurse may be engaged; private or institutional work, or in any of the specialties, sooner or later she comes in intimate contact with bacterial diseases where a working knowledge of bacteriology is necessary for intelligent and competent management. She should understand why certain precautions are necessary in handling and disposal of excreta from a patient suffering with typhoid fever and likewise in the proper collection and disposal of sputum from the patient with pulmonary tuberculosis. The terrors of surgery and motherhood have largely been overcome by the development of bacteriology. The modern aseptic surgical technic with its brilliant results were practically undreamed of thirty years ago, and even in the humblest homes a few well-known precautions in technic will effectually prevent infection during labor and save countless lives from puerperal sepsis. The nurse comes in intimate contact with the patient during and after an operation; to her is entrusted the proper preparation of patient, instruments and dressings with the one great object in view: the destruction of the unseen organisms which may be so potent for injury and death, and thus so worthy of our best efforts to destroy. Continuous routine practice may make a nurse competent to handle such situations and develop in her the "aseptic habit," but she is likely to be even more competent and, most important of all, more conscientious if she has had the opportunity of actually seeing and studying the disease-producing power of her hitherto unseen foes and the best methods of their destruction. If a nurse is skeptical and doubtful of the power of certain bacteria while in training she is not likely to be careful and competent when removed from the watchful care of the teacher unless taught the lesson later by some unfortunate experiment in which another human being is the suffering victim.

The keynote in the teaching of bacteriology should be the "see it yourself" and as far as possible the "do it yourself" principle conducted in the laboratory. Brilliant lectures, elegant drawings and awe-inspiring terms and descriptions do not equal the value of one actual demonstration. The pupil enters upon the study of this subject either with preconceived ideas regarding the universal deadliness of bacteria in general or with a very skeptical and dubious state of mind towards the whole subject. At once her mind should be disabused of the idea that all bacteria are harmful, and the fact should be emphasized that a certain group is absolutely essential to life and health, that the minority are harmful and disease-producing. Lectures should be brief, simple, and to the point, and most time spent in the laboratory. The actual manipulations may be too intricate or consume too much time for each

pupil to execute, but all may observe the technic of the demonstration in making cultures, smears, etc., and then each pupil may make the microscopical examinations. During the course pus from the dressing room is examined; tubercle bacilli demonstrated in sputum; gonococci in discharges; soiled and sterilized gauze cultured; likewise soiled and sterilized rubber gloves and instruments are cultured and cultures made of a pupil's hands before and after the usual preparations for an aseptic operation. The nurse is taught the first principles concerning the reason for sterilization and why she cannot afford to be careless. Practical sterilization of dressings, instruments, etc., is taken up, followed by a consideration of the proper handling and destruction of feces, urine, sputum, discharges, etc. Special stress is laid upon the pyogenic and other ordinary pathogenic bacteria and the relation of milk and water to disease.

While the subject of immunity does not permit extensive demonstration, yet phagocytosis can easily be taught. In a few simple words the pupil may be taught what is meant by immunity and its kinds, and made to understand one or two theories regarding its production. Special stress is laid upon diphtheria antitoxin and vaccination with cowpox virus and the prevailing ideas regarding the working of these explained. The subject opens up to the nurse a new aspect of medicine and cannot fail to stimulate a healthy enthusiasm.

The course also includes elementary instruction in urinalysis. Each pupil is taught to observe the physical characteristics of urine and test its reaction, estimate correctly the specific gravity, and conduct one or two simple qualitative tests for albumen. A nurse equipped with such simple knowledge would frequently prove of value to the attending physician either in private or hospital practice. In the armamentarium of such a nurse should be found a couple of small thin-walled test tubes, a vial of litmus paper, a urinometer and a bottle of acetic or nitric acid, as well as the time-honored thermometer and hypodermic syringe.

Appended is a synopsis, slightly modified, of the course in bacteriology which I gave the class in the training school connected with the hospital of the Philadelphia Polyclinic and the Philadelphia Hospital for Contagious Diseases. I have been more than gratified with the progress made by the pupils and by their eager grasp of the subject.

The demonstrations were usually held twice a week, for three weeks, making six periods in all. Each period lasted from one and a half to two hours. The first portion of the period was taken up by a brief lecture and the balance by work in the laboratory. Bi-weekly periods have the advantage of enabling the student to grasp the subject and to

follow the results of cultures. During the course a graduate nurse quizzed the class and examined and corrected note books.

First Period.—1. Development and scope of bacteriology. Brief historical sketch. 2. General characteristics of bacteria. 3. Bacteriological technic. 4. Relation of bacteria to disease.

Second Period.—The pus-producing bacteria. The class is required to bring to the demonstration, specimens of pus suitably preserved. Direct smears and cultures are made and examined. Modes of infection are thoroughly explained.

Third Period.—1. The common pathogenic bacteria: Bac. Typhosus; Bac. Diphtheria; Bac. Dysenterica; Bac. Tuberculosis; Bac. Pyocyaneus; Pneumococcus; Gonococcus, etc. The life history and mode of infection in each with special reference to various measures preventing infection. Examination of cultures and slides.

Fourth Period.—1. The destruction of bacteria by chemicals. Practical use and comparative value of disinfectants, antiseptics, germicides. Practical disinfection of discharges, fæces, urine, sputum, etc. 2. Methods of sterilization. Fractional sterilization. Sterilization of milk for feeding infants. 3. The class is required to bring to the demonstration a piece of soiled gauze and one of sterile gauze; a soiled glove and one which has been sterilized; a used instrument and a sterilized one, etc. A pupil has her hands cultured and is then required to go through the full and regular technic in preparation for an aseptic operation. Hands (particularly finger nails) are recultured. Cultures are made of above articles and examined two days later at the following demonstration.

Fifth Period.—1. Principles of immunity. Phagocytosis. Explanation of Erlich's theory. Explanation of opsonins. Widal reaction. 2. Relation of milk to disease. 3. Personal hygiene; hygiene of sick room and other practical hygienic subjects.

Sixth Period.—1. Physical properties of urine. Proper methods of collection and preservation. 2. Reaction; specific gravity. 3. Albumen and qualitative tests.